

Differential Diode Laser Sensor for High-Purity Oxygen, Phase I

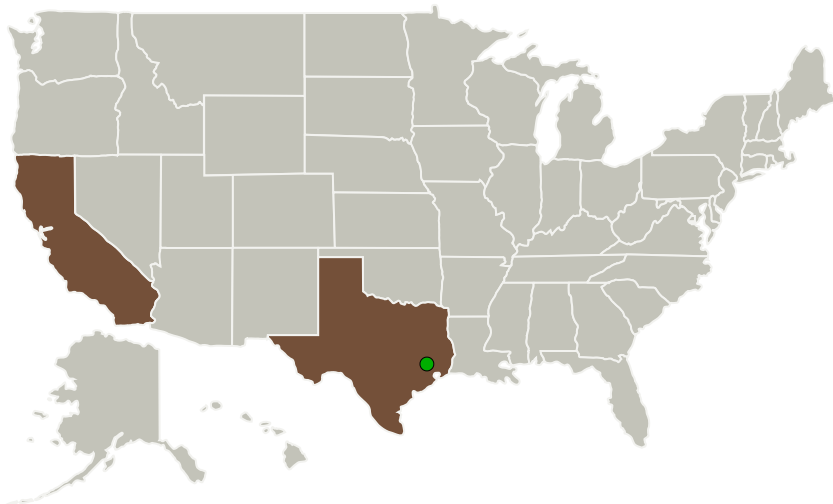
Completed Technology Project (2011 - 2012)



Project Introduction

A compact portable sensor for determining the purity of oxygen concentrations near 100 percent is proposed based on differential absorption of two beams from a diode laser. One beam passes through a cell containing the sample of gas to be analyzed and the second beam passes through a reference cell containing a known concentration of high-purity oxygen. An autobalanced detection system will be used for measuring the difference in photocurrents of the transmitted beams. Common mode noise such as laser intensity noise will be rejected to a high degree. The system should not be subject to drift because it would be possible to lock the laser wavelength to the oxygen line using the reference cell. We estimate that the proposed sensor concept should enable an accuracy of 0.05 percent to be achieved with a cell length of less than 10 cm. The sensor can be made rugged with a small footprint using microelectronics for laser control and signal processing. The proposed effort will test the feasibility of this sensor concept by seeking to demonstrate measurements of the desired accuracy using a breadboard system.

Primary U.S. Work Locations and Key Partners



Differential Diode Laser Sensor
for High-Purity Oxygen, Phase I

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

Differential Diode Laser Sensor for High-Purity Oxygen, Phase I

Completed Technology Project (2011 - 2012)



Organizations Performing Work	Role	Type	Location
MetroLaser, Inc.	Lead Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Laguna Hills, California
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas
Stanford University(Stanford)	Supporting Organization	Academia	Stanford, California

Primary U.S. Work Locations

California	Texas
------------	-------

Project Transitions

▶ **February 2011:** Project Start

✓ **February 2012:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138936>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

MetroLaser, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

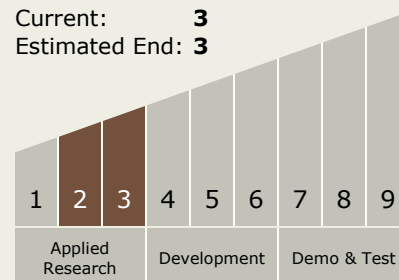
Carlos Torrez

Principal Investigator:

Tom Jenkins

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 3



Differential Diode Laser Sensor for High-Purity Oxygen, Phase I

Completed Technology Project (2011 - 2012)



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.5 Lasers

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System